PCT

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(54) Title: DATA CONFERENCING BETWEEN REMOTELY LOCATED PARTICIPANTS
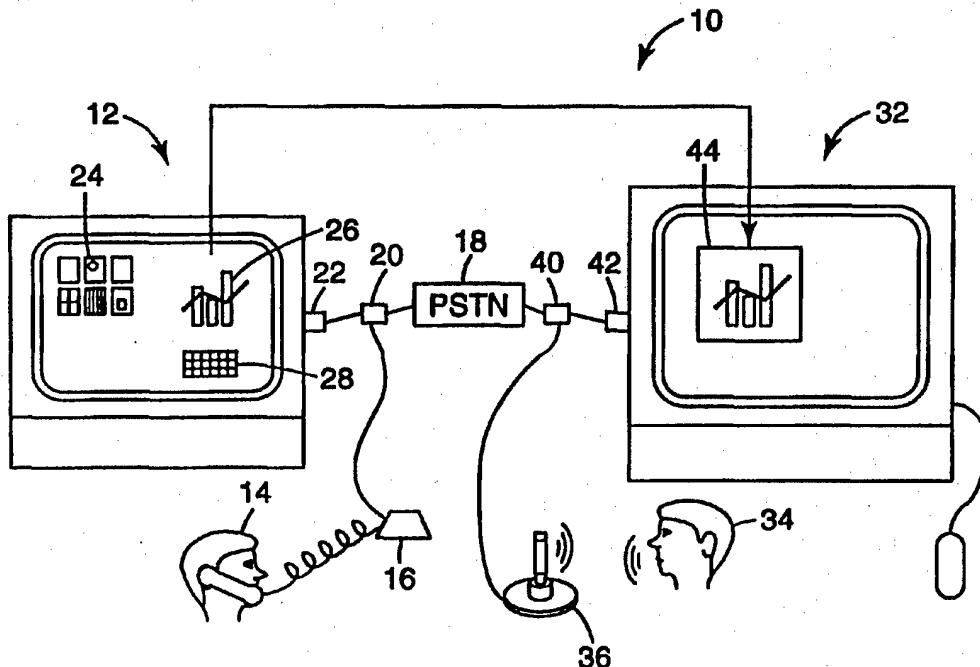
(57) Abstract

A method for facilitating data communications between remotely located conference participants. Data from documents to be shared with the conference participants is converted into a database of images, which is then transferred to the remote locations. The conference leader (14) then holds a teleconference with the participants (34), during which the standard telephone line (18) being used by the participants (16, 36) is also used to transmit data commands (22, 42) which select various images (44) in the database for display on the participants' computer monitors (32).

DATA CONFERENCING BETWEEN
REMOTELY LOCATED PARTICIPANTS

5   Field of the Invention

The present invention relates generally to communications among remotely located persons, and more specifically to communications involving the transfer of visual aids among such persons engaged in a teleconference.

10   Background of the Invention

For many years, business people have communicated by mail, telephone, and, when required, in person. The high cost of travel (both time and money), coupled with the expanding number of suppliers, customers, and co-workers, have lead business people to look for more efficient ways of communicating. Facsimile, voice teleconferencing, and video teleconferencing are among the more popular solutions employed today.

Video teleconferencing, in theory, holds the richest form of remote electronic communications but comes with several drawbacks: the equipment is very expensive, the communication costs are very high (due to the wide bandwidth required), the interactivity is far from "the same as being there," and no clear standards exist (so company-to-company video teleconferencing is not very common). Still, the need to improve the "business conferencing" process is very real, and several products have recently become available to address the need to improve personal communications over a network.

One category of such products is called "shared screen" or shared "white board." This refers to the ability to have one image area, called a white board (see FIGURE 1), shared in common on several networked computers. When using such a product, any conference participant may place an image "onto" the white board for all to see. Furthermore, any participant can draw on the white board and this drawing will show up on the other white boards. This functionality is especially useful during "brainstorming" by, for example, engineers on a design team. In this

technology, the documents are usually images, not application-specific data, such as actual word processing or spreadsheet data. As such, the output of a white board conference results in a consensus among the group and a shared understanding, but not a set of data in its final form.

5   Another category of products is called "shared application." Users jointly view and manipulate the same application data simultaneously across several computers on a network (see FIGURE 2). In this mode, any participant may make a change (for example, change the data in a spreadsheet) and everyone's data changes. The outcome of this conference is a new set of data. This is helpful in 10   collaborative text writing or collaborative design.

Both shared screen and shared application systems can incorporate compressed video. This is often far less sophisticated than full video conferencing, but it does allow the option of viewing a speaker. This is sometimes referred to as a "talking head."

15   Shared white boards and shared applications require a two-way data channel and a two-way voice channel. One network configuration commonly used by these systems incorporates a local area network (LAN) for the data channel and the public switched telephone network (PSTN) for voice channel (see FIGURE 3). A second configuration is to use specially equipped integrated services digital network 20   (ISDN) for both voice and data (see FIGURE 4). A third approach is to use the PSTN exclusively. If the PSTN is used for both data and voice communication for these systems, then either two separate phone lines are utilized (FIGURE 5A) or a special voice/data modem be incorporated (FIGURE 5B).

All of these systems strive to include the following hierarchical elements of 25   communication:

1.   Image/data assisted discussions/decision making.

2.   Interactivity through both voice and image/data manipulation.

3.   Visual contact with the participants to allow "body language" to be included.

30   However, in striving for "full and rich" communications, many of these solutions have several major drawbacks, such as:

1.   They require specialized communication hardware, thereby impairing widespread use.

2.   The solutions are essentially immobile, thereby making it difficult for a mobile worker to use the capability while traveling.

5   3.   The solutions consume substantial communication bandwidth, thereby making routine use expensive.

4.   Most solutions require the same operating system, the same application software, and the same brand of communication hardware at each computer location, thereby impairing casual use.

10   5.   No clear standards exist, further impairing widespread use.

6.   Solutions which require simultaneous data and oral communications on a single telephone line result in voice degradation and/or expensive communications hardware.

There is currently a wide gap between the current widespread use of
15 facsimile and teleconferencing and the limited use of the above-mentioned systems. It would be desirable to have an inexpensive, easy-to-use, widely-available, system-independent, image/data assisted teleconferencing system.

Summary of the Invention

20   The present invention includes a method for facilitating data communications between remotely located conference participants. The method begins by converting data from documents to be shared with the other participant(s) into data representing viewable images, thereby creating a database of images. This conversion process preferably includes converting the data into a platform-
25 independent database of images. Preferably, a unique address is assigned to each of the images.

Next, a copy of the image database is transferred to each remotely located computer. This may be accomplished either by storing the database on transportable storage media and physically transporting the media to the remote
30 location, or by transferring the database via a data modem over a communication channel to each remotely located computer. If data transmission is used, it may be

desirable to scramble the transmission to ensure that the secrecy of the data is not compromised.

During the teleconference, various images from the database copies are displayed on each remotely located computer monitor. The selection of which image from the database to be displayed is controlled by issuing data commands over the same telephone line that is being used to transmit the oral discussion between the conference participants. These data commands can also be used to highlight a portion of the image displayed on each monitor.

The present invention offers a low-cost, simple system for conducting a teleconference accompanied by graphic displays on the computer monitors of the conference participants. Because the images to be displayed have been previously sent to each of the participants, either via physical transfer of storage media or via data transmission, the conference leader (or presenter) can control which image is displayed on the participants' monitors by using a data command over the same telephone line being used to transmit the oral discussion among the participants. Since the images are already stored at each remote location, the transmission of the data command which controls the remote visual aids need be no longer than 2 seconds, and is more preferably less than 1 second. In one preferred embodiment, a data command lasts between 0.03 and 0.6 seconds. Although the transmission of the data commands interrupts the oral discussion among the participants with an audible signal, the brief duration of the interruption results in minimal interference with the discussion.

In one embodiment, the 300 bit/sec low-speed channel available in most standard modems is used to transmit data commands from the presenter to select a specific visual aid in the database to be displayed on each monitor. Oral discussions between the presenter and one, two, or more participants may be conducted via standard telephone lines.

The system of the present invention is convenient in that it uses pre-existing telephone lines and industry standard facsimile modems. By using a platform-independent database of images, a conference call may be conducted regardless of

what type of computer system each participant has. Thus, compatibility of computer systems among the participants is not required.

Brief Description of the Drawing

5   FIGURE 1 shows a prior art shared screen approach to teleconferencing.

FIGURE 2 shows a prior art shared application approach to teleconferencing.

FIGURE 3 shows a prior art approach to teleconferencing using a local area network and a public switched telephone network.

10   FIGURE 4 shows a prior art approach to teleconferencing using a specially equipped ISDN network for both voice and data.

FIGURE 5A shows a prior art approach to teleconferencing using a public switched telephone network having separate phone lines for voice and data communication.

15   FIGURE 5B shows a prior art approach to teleconferencing using a public switched telephone network having a special voice/data modem.

FIGURE 6 shows how source data is converted to an image database according to the present invention.

FIGURE 7 shows how copies of the image database are transmitted to 20   remotely located computers according to the present invention.

FIGURE 8 shows how the presenter sends a data command to bring up the various stored visual aids onto a participant's computer monitor according to the present invention.

FIGURE 9 shows how two systems could be used to share visual aids 25   during a voice teleconference according to the present invention.

FIGURE 10 shows how a single channel of a public switched telephone network can be used to transmit both voice and data according to the present invention.

Detailed Description

The present invention is directed to a system which allows remotely located conference participants to present pertinent visual aids at each other's location while conducting a conversation via telephone. The system can operate over a single
5   public switched telephone network (PSTN) line and is compatible with the vast, currently-existing base of computers, irrespective of operating system. The system is also far less expensive than conventional video conferencing.

The system operates as follows. A database representing viewable images to be used as computer-based visual aids is created. In one embodiment of the
10   present invention, the database is converted into a platform-independent database of images. This conversion process may be accomplished by any of a variety of software programs, such as "Adobe's Acrobat" available from Adobe Systems, Inc., in Mountain View, California, U.S.A.

Each of the images is then assigned a unique address comprising, for
15   example, the sender's user identification code and the numerical code in which the images were converted (see FIGURE 6). This allows the images to be uniquely referenced in both point-to-point and broadcast operation.

Next, a copy of the database is transferred to each of the remote locations with which the sender wishes to communicate (see FIGURE 7). This may be
20   accomplished by either storing the images on media and physically transporting the media to the remote locations, or by transferring the copy of the database over a communication channel between the remote locations with the aid of a high speed modem. An example of such a modem is a standard 14,400 data/fax modem available from 3M in St. Paul, Minnesota.

25   Because the data can be highly compressed, the information transfer can be faster than facsimile transfer. The transferred image is also of greater quality than if transferred via facsimile, and may also be in full color. If the image data being transferred via modem is of a confidential nature, it may be desirable to scramble the image database.

30   After the database has been transferred to the remote locations, copies of all the stored images reside in the remote computer(s) and each image is uniquely

addressable with a short code. A normal voice teleconference can now be held among the participants and when the conference leader or speaker wishes to refer to a document to make a point, the speaker, using his/her computer, broadcasts a short data command to the remote location(s) which brings up the image on each

5   participant's computer monitor (see FIGURE 8). Since only a brief data command is required, the command can be effectively communicated by a modem operating in a low speed asynchronous character transfer mode, e.g., 300 bits/second. The data command will be very brief in duration and can be sent within the voice band. The participant will hear a brief audible signal similar to a "beep" immediately preceding

10   each new image. Since the data command is short, voice conversation will have use of the full bandwidth, thereby providing the best voice fidelity that the channel can support, except during the short interval when the data command is being transmitted. (Simultaneous voice/data modems share the bandwidth between voice and data and thus degrade the quality of the voice.)

15   The data commands may be communicated by public switch telephone network using 300 bits/second as defined by International Telecommunications Union (ITU) V.21 standard modulation in standard facsimile modems, such as one available from 3M Company, St. Paul, Minnesota.

           To simplify this task, the software at the speaker's computer would provide

20   a user interface which would show him/her, as shown in FIGURE 8: 1) a list of "thumbnail size" images 2 that had been previously sent (to aid in selecting an image to refer to), 2) a "speaker panel" 8 to manage the flow of images, and 3) a blow-up 4 of the image currently being referred to. This application software would be resident in each computer.

25   The operational steps would be as follows. Referring to FIGURE 9, one of the telephone participants, speaker or caller 14, on first computer system 12 would initiate a conference by dialing a telephone number either manually by handset or speaker phone 16, or automatically by modem 22. At the receiving end, participant 34 on second computer system 32 would be notified that an image assisted

30   teleconference, i.e., a data conference, is desired. Participant 34 would activate

appropriate software in second computer system 32, and from that point onward all operations at participant's end would be automatically controlled by caller 14.

First computer system 12 would send the database to system 32 over PSTN 18 using modem 22. Caller 14 and participant 34 would then hold a normal conversation using handset or speaker phones 16 and 36.

During the conversation, caller 14, referring to a thumbnail sized array of images 24, would use caller controls 28 to select a pertinent image 26 to be pulled up and displayed by the software on computer system 32. This would be accomplished as follows. Software in computer system 12 would identify the address of selected image 26 from displayed image array 24 on the monitor of computer system 12 and send a coded command from modem 22 to modem 42 at system 32. The software in system 32 would locate the selected image in the database and would display it as image 44 on the monitor of system 32.

Connector 20 is a common, widely-used device for tying handset 16 and modem 22 into PSTN 18. Similarly, connector 40 is a common, widely-used device for tying speaker phone 36 and modem 42 into PSTN 18.

Caller 14 may also elect to use caller controls 28 to highlight a portion of image 44 on the monitor of system 32. This might be done by caller 14 to emphasize to participant 34 the importance of a specific portion of image 44. In this case, the software in computer system 12 would transmit the command to the software in computer system 32, which would highlight the appropriate part of image 44 on the monitor of computer system 32.

If participant 34 desired to print image 44 on a printer attached to computer system 32, the participant would communicate this desire orally via PSTN 18. Caller 14 would then have the capability to either deny the request or release image 44 for printing. In the absence of such a request, image 44 will be automatically erased by the software in computer system 32 when the telephonic connection is terminated at the end of the teleconference. Caller 14 could also transfer control of the presentation to one of the participants if the caller so desires, so long as the participants have the appropriate software.

Since image data is sent prior to using the phone line for voice, one PSTN connection can be used for both voice and data (see FIGURE 10).

The system of the present invention has the following unique features:

1.   It provides interactive, image-assisted teleconferencing with multiple locations over one voice circuit on the public switched telephone network (this includes cellular telephones operating on the public network).

2.   It provides image-assisted teleconferencing between dissimilar computers and dissimilar operating systems.

3.   It encourages widespread use since it is backward compatible with most existing systems.

4.   It is completely upwardly compatible with LAN and simultaneous voice/data modems.

5.   It is likely to be compatible with future computer hardware and software since it can work in conjunction with, and not in competition with, white board shared application and full video technologies.

Those skilled in the art will appreciate that the present invention is not limited to the embodiments described above. For example, although FIGURE 9 shows a single caller 14 and a single participant 34, two or more such participants may also be included. Similarly, although FIGURE 9 shows only one caller 14 and one participant 34, participant 34 might also be a "presenter" or "caller" to caller 14. Thus, while caller 14 may have sent a copy of one image database to participant 34, participant 34 may have also sent a copy of another image database to caller 14. Thus, while caller 14 controls which images in the first database are being shown on the monitor of participant 34, "participant" 34 controls which images in the other database may be shown to "caller" 14.

What is claimed is:

1.   A method for facilitating interpersonal communications between remotely located conference participants (14, 34), each participant having access to a computer (12, 32) and a monitor associated therewith, including the steps of:

(a)   creating a database representing viewable images to be used as computer-based visual aids to be shared with at least one remotely located conference participant (34);

(b)   transferring a copy of the database to each remotely located computer (32);

(c)   displaying the visual aids (44) from the database copy on monitors associated with each remotely located computer; and

(d)   using a single standard telephone line (18) to both (i) transmit oral comments (16, 36) from one participant to another, and (ii) transmit audible signals representing data commands to select a specific visual aid within each remotely located database copy to be displayed on each monitor, wherein the transmission of oral comments is temporarily overridden by the audible signals, wherein each audible signal lasts less than 2 seconds.

2.   The method of claim 1, wherein step (d) includes issuing data commands that highlight a portion of the image displayed on each monitor.

3.   The method of claim 1, wherein the database is a platform-independent database.

4.   The method of claim 1, further including the step, after step (b), of retrieving the visual aids based on their unique address.

5.   The method of claim 1, wherein each audible signal has a duration between 0.03 and 0.6 seconds.

6. The method of claim 1, wherein step (b) is accomplished by storing the copy of the database of images on transportable storage media and physically transporting the media to each remotely located computer.

7. The method of claim 1, wherein step (b) is accomplished by transferring the database of images over communication channels connecting the remotely located computers via a standard modem (22, 42).

8. The method of claim 1, wherein the data commands issued in step (d) include controlling which of the images being displayed on each monitor can be released for printing at the location of each monitor.

9. A method for facilitating interpersonal communications between a presenter (14) and at least one remotely located conference participant (34), the presenter and each participant having access to a computer (12, 32) and monitor associated therewith, including the steps of:

(a) creating a database representing viewable images to be used as computer-based visual aids to be shared with at least one remotely located conference participant;

(b) transferring a copy of the database from the presenter to each remotely located computer via modem;

(c) displaying the visual aids (44) from the database on monitors associated with each remotely located computer; and

(d) operating a modem (22, 42) in a standard 300 bit/sec low-speed mode to transmit data commands from the presenter to select a specific visual aid in the database copy to be displayed on each monitor; and

(e) transmitting oral comments (16, 36) between the presenter and each participant via standard telephone lines (18).

10.   A method for facilitating interpersonal communications between a presenter (14) and at least one remotely located conference participant (34), the presenter and each conference participant having a computer (12, 32) and monitor associated therewith, including the steps of:

5   (a)   creating a database representing viewable images to be used as computer-based visual aids to be shared with at least one remotely located conference participant;

(b)   transferring a copy of the database from the presenter to each remotely located computer;

10   (c)   displaying the visual aids (24) from the database on the presenter's monitor and from the database copy (44) on monitors associated with each remotely located computer; and

(d)   using a single standard telephone line (18) to both (i) transmit oral comments (16, 36) between the presenter and each participant, and 15   (ii) transmit data commands from the presenter to select a specific visual aid in the database to be displayed on each monitor, wherein only the presenter can issue the data commands unless the presenter transfers such control to another conference participant.

20   11.   The method of claim 10, wherein there are at least two conference participants.
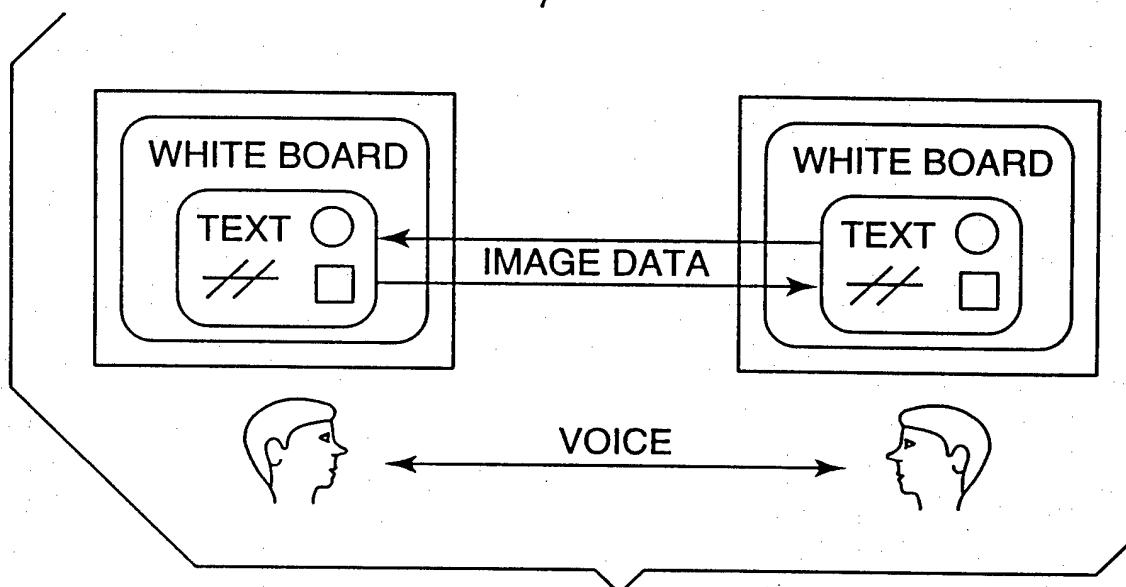
**Fig. 1**
PRIOR ART

Fig. 2
PRIOR ART

LAN

DATA
CHANNEL

VOICE
CHANNELS

PUBLIC SWITCHED
TELEPHONE NETWORK

Fig. 3
PRIOR ART

SPECIALIZED ISDN

DATA   DATA   DATA   DATA

VOICE   VOICE   VOICE   VOICE
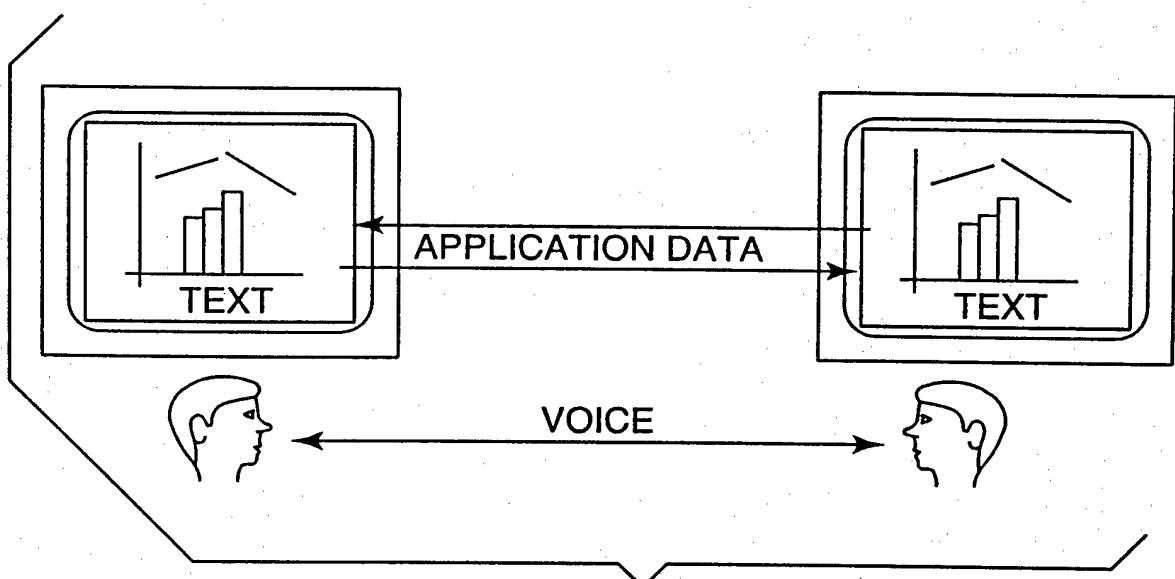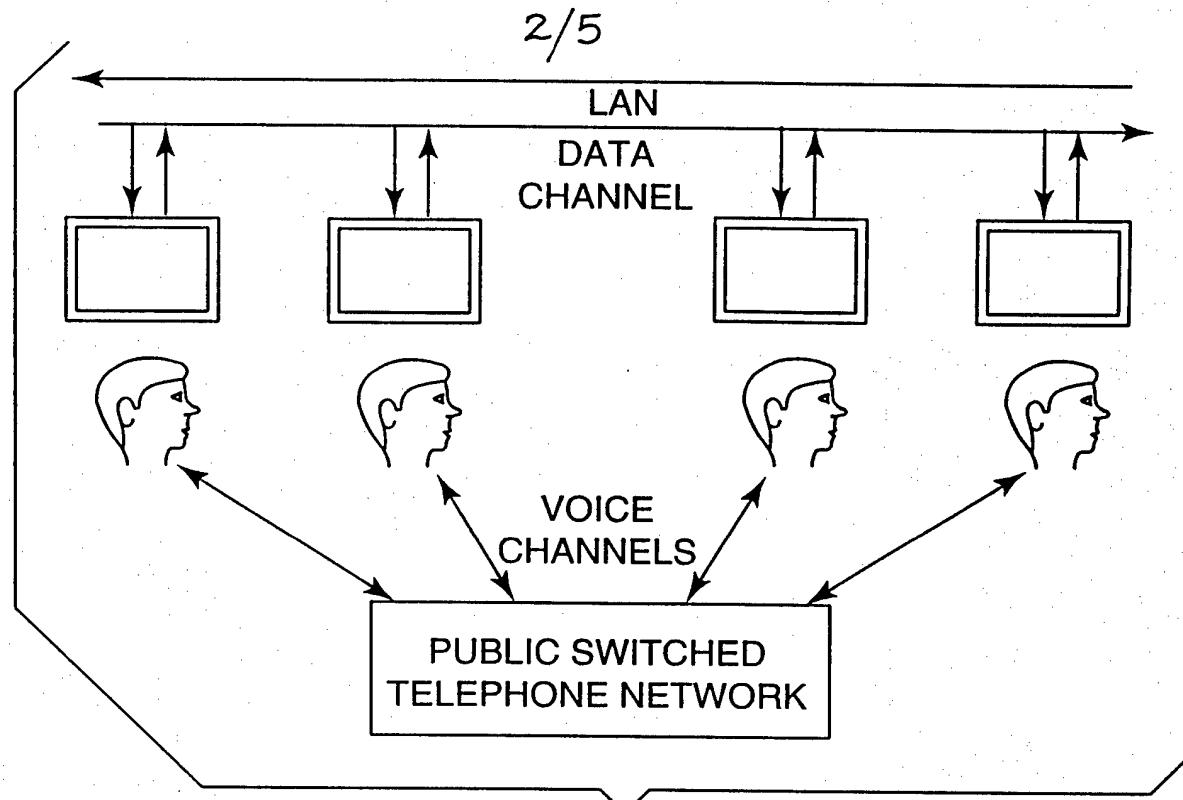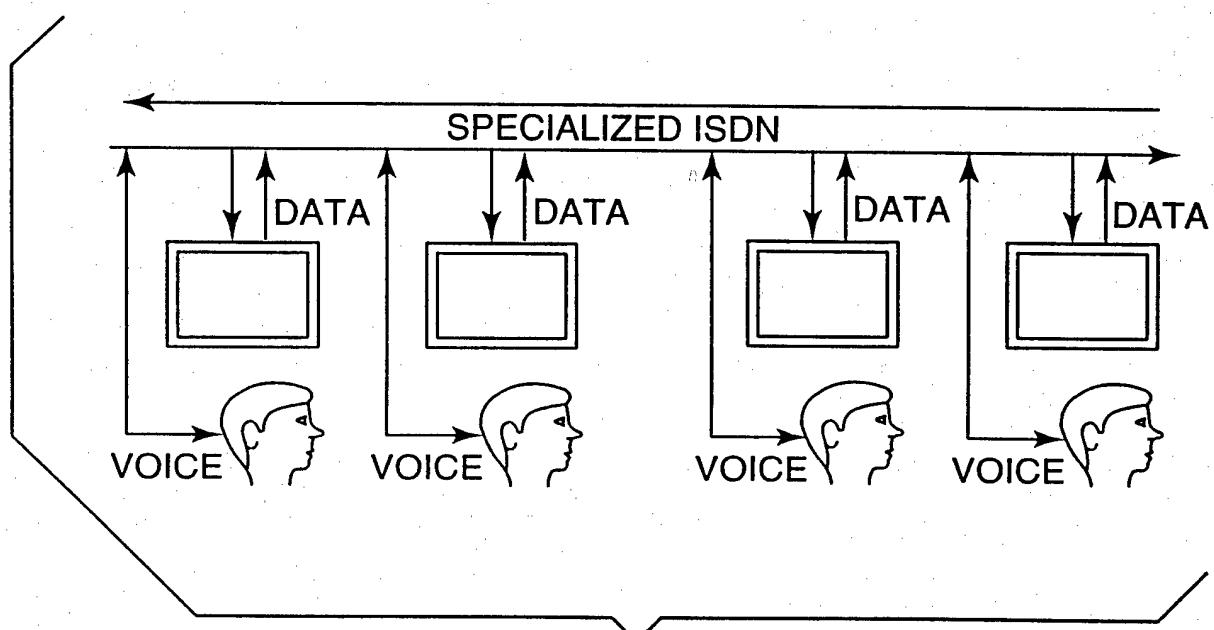
Fig. 4
PRIOR ART
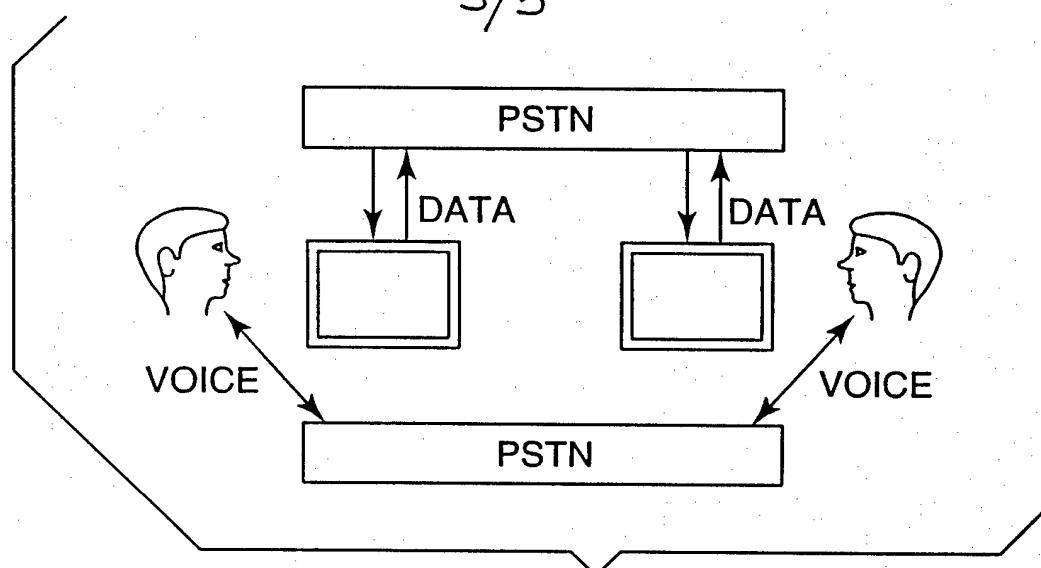
Fig. 5A
PRIOR ART

Fig. 5B
PRIOR ART

CONVERT INTO
UNIVERSALLY
VIEWABLE IMAGES

TLM3
TLM2
TLM1

Fig. 6

STORE IMAGES WITH
ADRESSING ONTO
A REMOVEABLE
MEDIA OR TRANSFER
THEM TO A REMOTE
STORAGE DEVICE

TLM3
TLM2
TLM1

IMAGE BASE

Fig. 7

4

SEND A COMMAND
TO DISPLAY A
CERTAIN IMAGE

2   8

TLM3
TLM2
TLM1

Fig. 8

IMAGE BASE
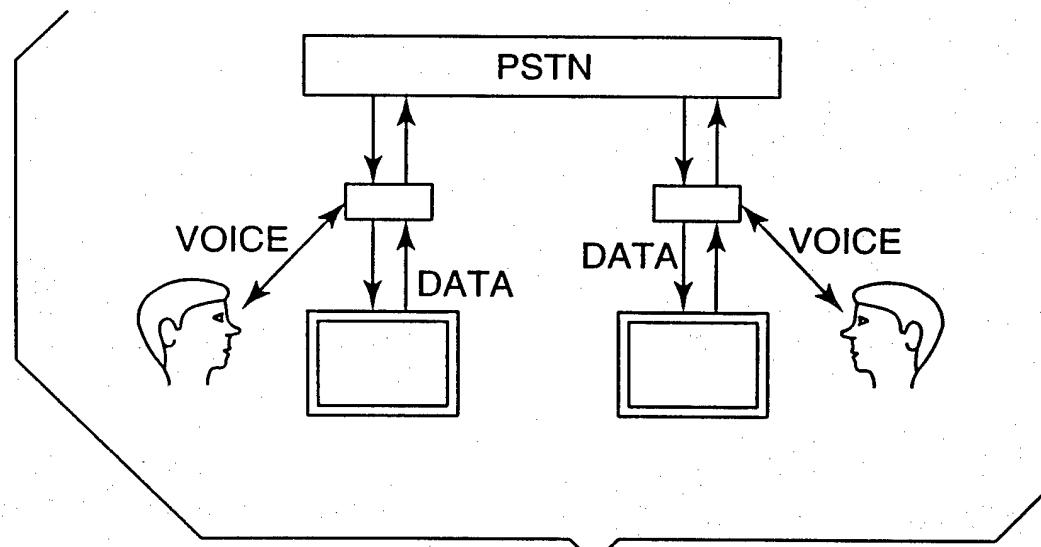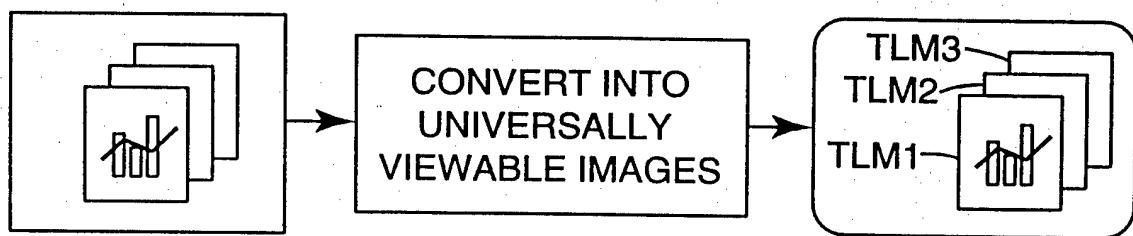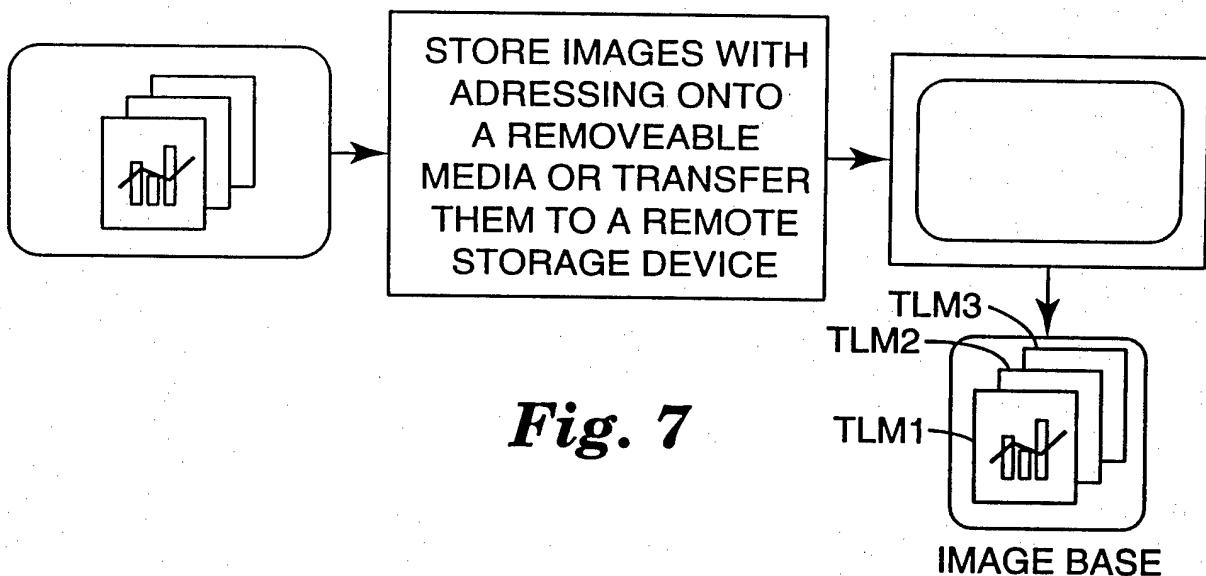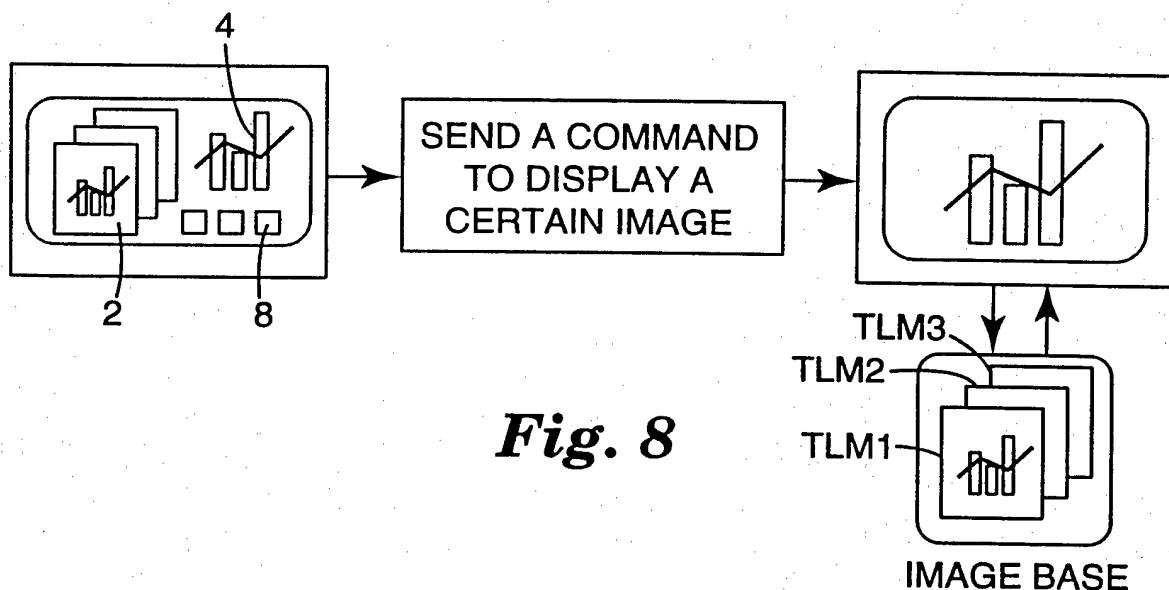
5/5
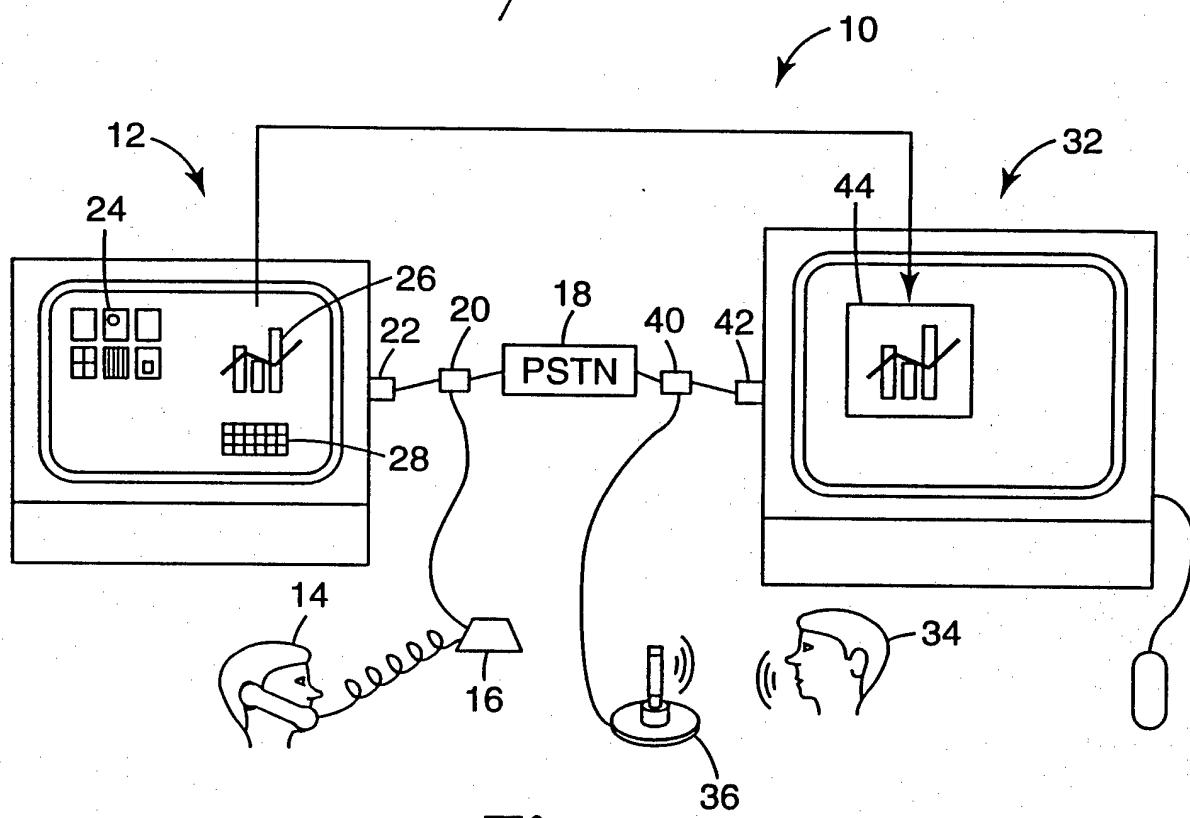
Fig. 9

Fig. 10

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6   H04M3/56   H04M11/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6   H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	ELECTRO INTERNATIONAL CONFERENCE RECORD, vol. 4, April 1979, CA US, pages 1-11, XP002005744 C.STOCKBRIDGE: "THE EVOLUTION OF A MULTIMODE MULTILOCATION AUDIOCONFERENCING SYSTEM" see page 5, left-hand column, line 6 - right-hand column, line 14 ---	1,4,6-11
Y	IEEE INTERNATIONAL CONFERENCE ON COMMUNICATIONS - SESSION 211.2, vol. 1, 15 - 19 April 1990, ATLANTA(US), pages 123-127, XP000147389 KOHZOH NAKAMURA ET AL: "PERSONAL MULTIMEDIA TELECONFERENCING TERMINAL" see paragraph 3.2 see paragraph 3.3 --- -/--	1,4,6-11

[X] Further documents are listed in the continuation of box C.   [X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 July 1996	07.08.96

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+ 31-70) 340-3016	Vandevenne, M

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	IBM TECHNICAL DISCLOSURE BULLETIN, vol. 22, no. 9, February 1980, NEW YORK US, pages 3923-3925, XP002005745 A.F.HIGGINBOTHAM ET AL: "TELECONFERENCE SYSTEMS" see the whole document ---	1,2,4, 7-11
A	EP,A,0 041 902 (FAYE ANDRE) 16 December 1981 see page 2, line 14 - page 5, line 23 ---	1,9-11
A	1988 INTERNATIONAL ZURICH SEMINAR ON DIGITAL COMMUNICATIONS, 8 - 10 March 1988, ZURICH(CH), pages 29-35, XP000216001 HIROYA TANIGAWA ET AL: "MULTIPOINT COMMUNICATION CONTROL FOR DOCUMENT-ORIENTED TELECONFERENCING" see paragraph 2.2 ---	1,9-11
A	PROCEEDINGS OF THE IEEE, vol. 73, no. 4, April 1985, NEW YORK US, pages 656-670, XP002005746 KAZUHISA WATANABE: "AUDIO AND VISUALLY AUGMENTED TELECONFERENCING" see page 663, left-hand column, line 5 - right-hand column, line 38 -----	1,9-11

1

Inter   nal Application No

PCT/US 96/05632

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		JP-A-	57026957	13-02-82
		US-A-	4805205	14-02-89